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# Revision of the "*Aemilia*" *ambigua* (Strecker) species-group (Noctuidae, Arctiinae)

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## Abstract

The New World taxa related to *Aemilia ambigua* (Strecker) are revised and transferred to the genus *Pseudohemihyalea* Rego-Barros, resulting in the following nomenclatorial changes: *Pseudohemihyalea ambigua* **comb. n.**, *P. fallaciosa* (Toulgoët) **comb. n.**, and *P. syracosia* (Druce) **stat. rev., comb n.** Two Mexican species are newly described, *P. sonorosa* **sp. n.**, and *P. potosi* **sp. n.** "*Aemilia*" *carmen* Schaus is also closely related to the *ambigua*-group, and is transferred to *Pseudohemihyalea*, **comb. n.** Like most species of *Pseudohemihyalea*, the *ambigua* species-group is restricted to southwestern North America and Central America. The forewing pattern and habitat association of the *ambigua*-group are likely the result of a novel larval host switch from broadleaf trees to pines (*Pinus* spp., Pinaceae). Adults and genitalia of all species are illustrated, except the female of *P. potosi* which is unknown. A key to the species of the *ambigua*-group is provided.

## Keywords

Arctiinae, Phaegopterini, *Aemilia*, *Pseudohemihyalea*, *Hemihyalea*, *Amastus*, Nearctic, Neotropic, taxonomy

## Introduction

The genus *Aemilia* Kirby currently includes six neotropical species, with an additional nine species misplaced in the genus (Watson and Goodger 1986; Toulgoët 1997) including the North American taxon *A. ambigua* (Strecker). *Aemilia* (*sensu stricto*) was

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associated with the *Euchaetes* Harris generic group by Watson and Goodger (1986) within the phaegopterines (Arctiini: Phaegopterina; family-group names used herein follow the changes proposed by Lafontaine and Fibiger 2006). *Aemilia ambigua* was correctly associated with *Hemihyalea* Hampson by Franclemont (1983), who placed *A. ambigua* prior to *Apocrisias* Franclemont and *Hemihyalea* in the North American checklist. The generic group placement of *Aemilia* within the Phaegopterina remains uncertain; based on the male genitalia of the type species, *Aemilia rubriplaga* (Walker, 1855), *Aemilia* does not appear to belong to the *Euchaetes* group as it lacks the characteristic complex structure of the uncus (Weller et al. 2008), nor does it belong to the *Amastus*-group, here defined as including *Amastus* Walker, *Pseudohemihylaea* Rego-Barros, *Apocrisias* Franclemont, and *Praeamastus* Toulgoët.

As discussed below, the *ambigua*-group species exhibit structural characters unambiguously placing them in *Pseudohemihyalea* Rego-Barros, although the wing pattern of the *ambigua*-group is atypical of *Pseudohemihyalea*. The forewing pattern of longitudinal striae along the wing veins (Figs. 1-5), appears to mimic the dried pine needles common in the habitat of these moths, whereas the typical wing pattern of other *Pseudohemihyalea* consists of a weakly defined transverse pattern (see for example Toulgoët 1994). Although *Pseudohemihyalea* has received more study than most neotropical arctiines, the dissimilarity in wing pattern between the *ambigua*-group and other *Pseudohemihyalea* has likely resulted in the oversight of this group's true generic affinity.

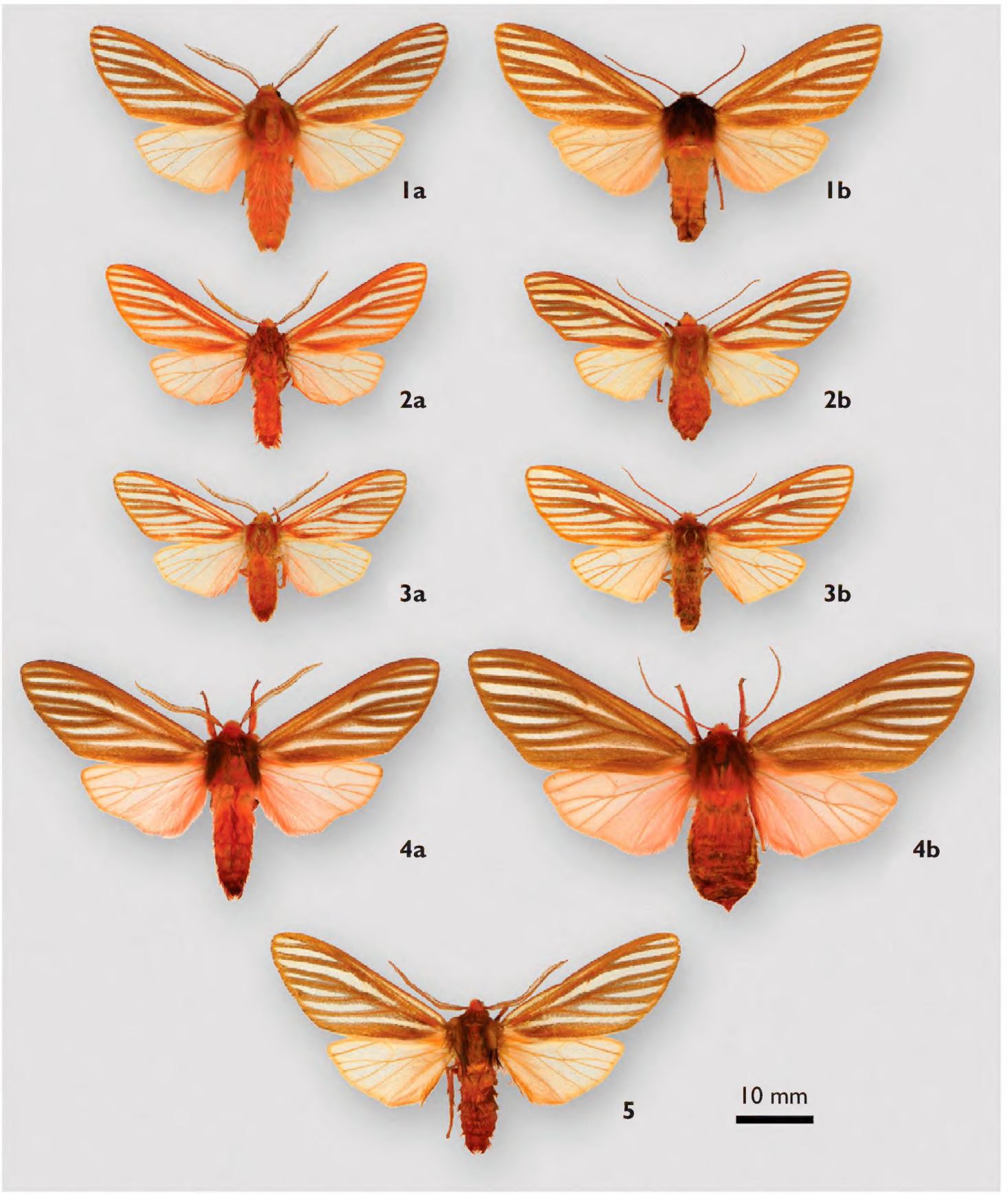
The purpose of this paper is to revise the generic placement and provide a taxonomic review of the "*Aemilia*" *ambigua* species-group and the closely related "*Aemilia*" *carmen* (Schaus). Two new species are described, and one name is raised from synonymy.

## Methods and materials

Adult genitalia were prepared following the methods detailed by Lafontaine (2004). Line drawings were prepared from genitalia suspended in 30 % ethanol, using a *camera lucida* mounted to a Leica M-165C dissecting microscope. Approximately 500 specimens were examined from the following collections: CNC, CSU, CMNH, DEB and USNM.

### Repository abbreviations

**AMNH** American Museum of Natural History, New York, New York, USA.
**CNC** Canadian National Collection of Insects, Arachnids, and Nematodes, Ottawa, Ontario, Canada.
**CSU** C.P. Gillette Museum of Arthropod Diversity, Colorado State University, Ft. Collins, Colorado, USA.
**CMNH** Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, USA.
**DEB** Personal collection of Don E. Bowman, Pueblo West, Colorado, USA.
**FMNH** Field Museum of Natural History, Chicago, Illinois, USA.
**MNHN** Muséum National d'Histoire Naturelle, Paris, France.




**Figures 1-5. 1a**. *P. ambigua* male (Santa Cruz Co., AZ, USA). **1b**. *P. ambigua* female (Cochise Co., AZ, USA). **2a**. *P. syracosia* male (Zacapa Dpto., Guatemala). **2b**. *P. syracosia* female (Chiapas, Mexico). **3a**. *P. fallaciosa* male (Chiapas, Mexico). **3b**. *P. fallaciosa* female (Zacapa Dpto., Guatemala). **4a**. *P. sonorosa* male paratype (Sonora, Mexico). **4b**. *P. sonorosa* female paratype (Sonora, Mexico). **5**. *P. potosi* male holotype (Nuevo Leon, Mexico).

**BMNH** Natural History Museum, London, UK.
**USNM** National Museum of Natural History (formerly United States National Museum), Washington, DC, USA.

## Systematics

### Generic placement of the "*Aemilia*" *ambigua*-group

The unnatural placement of *Aemilia ambigua* within *Aemilia* was recognized by Watson and Goodger (1986), who placed this taxon within *Aemilia* "sensu lato." An additional *Aemilia* species, *A. carmen* Schaus, was inadvertently omitted by these same authors. While investigating the generic placement of *A. ambigua*, it became apparent that the male genitalic structure of *A. ambigua* is virtually identical in gross morphology to that of *A. carmen* (illustrated in Watson 1971), despite marked differences in wing pattern. *"Aemilia" carmen* and the *ambigua*-group are very similar structurally to *Pseudohemihyalea daraba* (Druce) and *P. anapheoides* (Rothschild) and to a lesser extent also to *P. testacea* (Rothschild) and *P. ochracea* (Rothschild). Furthermore, the phenotype of *P. anapheoides* shows characters transitional between those of the typical banded *Pseudohemihyalea* pattern and that of the *ambigua*-group in that the forewing banding is highly reduced, the ground colour is whitish yellow, and the veins are outlined in rusty brown. The pink colouration of the dorsal abdomen is shared among *P. ambigua, P. schausi, P. testacea, P. daraba* and *P. anapheoides*. The following structural characters are shared between *A. carmen*, the *ambigua*-group, *P. daraba* and *P. anapheoides*: base of uncus broad and lobe-like (deeply excavated in *P. schausi* and the *P. edwardsii* group), apex of uncus tapering to a point (bifid in *edwardsii* group), process of transtilla relatively small and scobinate (with large cornuti in some *Pseudohemihylea* species; transtilla elongate, large and finger-like in *Amastus*); valve flattened and lobate overall, divided into two lobes beyond apical third or less (deeply divided and/or with a third, costal process in some *Pseudohemihylaea* and most *Amastus* species). Wing venation, palp structure and structure of the spines on the legs are fairly constant across *Amastus* and *Pseudohemihylaea*, and are consistent with those of the *ambigua*-group and *A. carmen*.

The close relationship between *ambigua* and *carmen* as indicated by male genitalic morphology (female *carmen* were unavailable for study) is also supported by molecular data (mtDNA *cox1* gene), with the two clustering together (4 % divergence) in a neighbour-joining tree containing representatives of most Central and North American arctiine genera (C. Schmidt, M. Laguerre, B. Vincent, unpubl. data). Both *ambigua* and *carmen* group within the current concept of *Pseudohemihyalea*, including the type species, *P. schausi* Rothschild. Based on this morphological and molecular evidence, *Pseudohemihylea ambigua* **comb. n.** and *P. carmen* **comb. n.** are accordingly transferred to *Pseudohemihyalea*. *Pseudohemihyalea carmen* and *P. daraba* are possibly the sister group to the *ambigua*-group, as suggested by morphology and mtDNA sequence data (*COI* barcode fragment). The striate forewing pattern of the *ambigua*-group appears to be a derived trait, likely linked with a larval host shift to conifers from the broad-leaved trees utilized by other *Pseudohemihylaea* species (e.g., *P. edwardsii* on *Quercus* species; McFarland 1975). Larvae of *P. ambigua* feed on Ponderosa pine (*Pinus ponderosa* Dougl. ex Lawson) (R. Nagle, pers. comm.), and it is probable

that other species of the *ambigua*-group also feed on pines. The striate white-and-tan wing pattern (mimicking dead pine needles) is an interesting example of convergent evolution in cryptic colouration in pine-feeding Lepidoptera, as a similar pattern occurs also in such unrelated groups as the Geometridae, such as the *Caripeta piniata* (Pack.) group and particularly *Sabulodes niveostriata* (Cockerell, 1894), which often occurs in strict sympatry with *P. ambigua*. A parallel (but evolutionarily independent) host switch has occurred (possibly multiple times) in *Lophocampa* Harris, where two lineages (*L. roseata*-group and *L. argentata*-group) feed on conifers, compared to deciduous trees for most congeners.

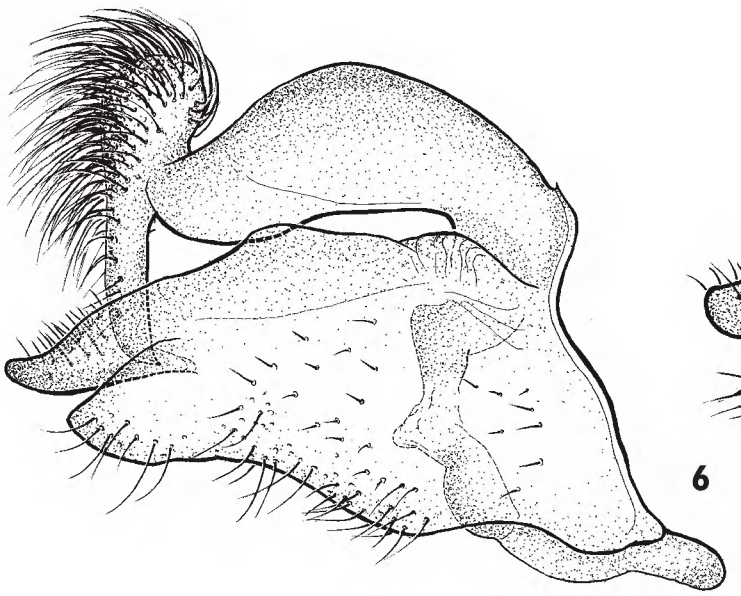
*Pseudohemihyalea* has a long and confusing taxonomic history, primarily a result of confusion with the genus *Amastus*. In describing *Hemihyalea*, Hampson (1901) distinguished this genus from *Amastus* by differences in the branching of the forewing radial veins. As noted by Dyar (1914), the branching pattern of the radial vein is highly variable in *Hemihyalea* and *Amastus* (as it is in a number of other arctiine genera such as *Grammia*, *Apantesis* and *Phragmatobia*), so this character is not diagnostic. In reviewing *Hemihyalea*, Rego-Barros (1956) recognized two additional genera, *Machadoia* Rego-Barros and *Pseudohemihyalea*, although only six species were examined. *Pseudohemihyalea* was later placed into synonymy under *Hemihyalea* by Watson and Goodger (1986). Toulgoët (1988) considered the type species of *Hemihyalea* (*Phaegoptera cornea* Herrich-Schäffer, 1853) to be congeneric with *Amastus* and accordingly synonymized the two, subsequently raising *Pseudohemihylaea* from synonymy (Toulgoët 1992) and providing a review of the genus (Toulgoët 1994), consisting primarily of those species treated as *Hemihyalea* by Watson and Goodger (1986). To complicate matters further, when describing *Pseudohemihyalea*, Rego-Barros believed the type-species to be *Phaegoptera rhoda* Druce, 1894 but the species he diagnoses and illustrates is *Hemihyalea schausi* Rothschild, 1909 (Toulgoët 1994). Following Toulgoët's (1994) review, several additional taxa were described or revised (see Toulgoët 1996, 2001).

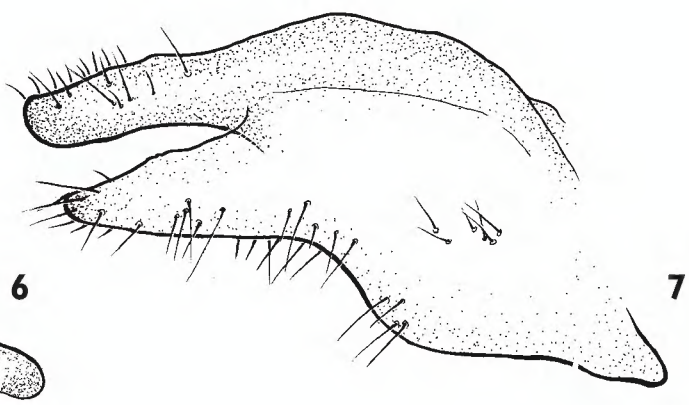
In summary, *Pseudohemihyalea* as currently defined is a relatively small group of about 30 species restricted to Central America and southern North America. Toulgoët (1994) arranged 20 species of *Pseudohemihyalea* into three groups, but provided no diagnostic characters or synapomorphies for the genus or for the three species-groups. Genitalic structure is very diverse in the *mansueta*-group (Toulgoët 1994) which may prove to be a polyphyletic assemblage. In addition, at least one species likely does not belong to *Pseudohemihyalea* (Toulgoët 1994), so much work is still needed to establish relationships among *Pseudohemihyalea* and related genera, and to objectively define the generic limits of the genus.

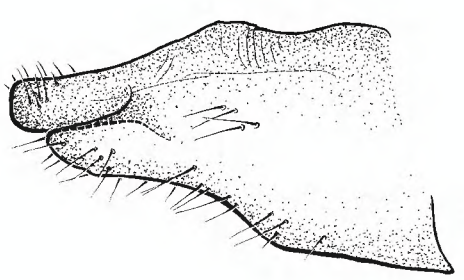
## *Pseudohemihyalea ambigua* species-group

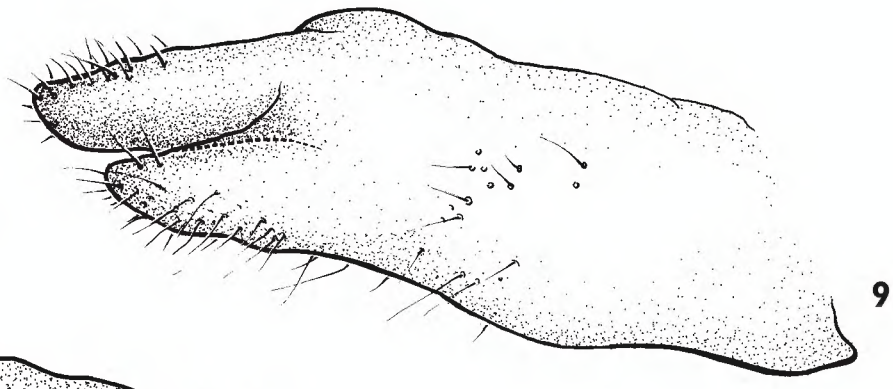
**Diagnosis.** Members of the *ambigua* species-group can be immediately recognized by the simple, striate forewing pattern (Figs. 1-5). Internally, the male uncus in dorsal

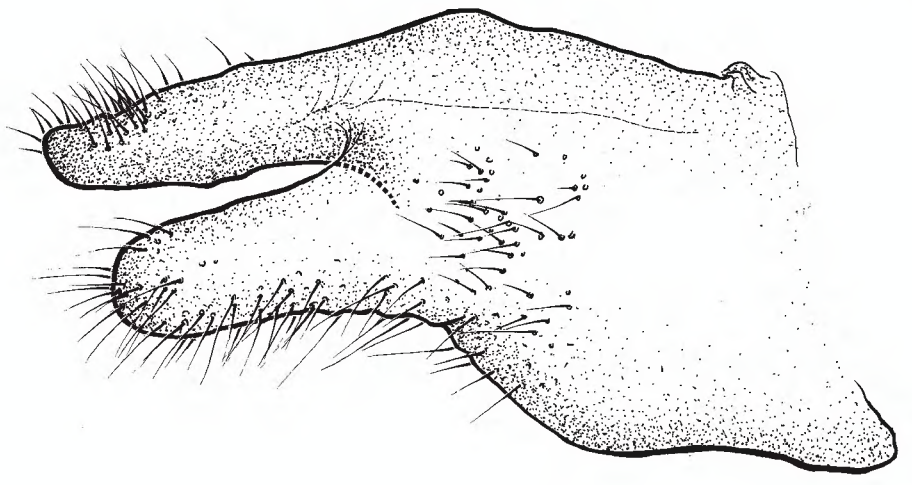
profile is characteristically shaped like a bicycle saddle (Figs. 11-15), with the apex slightly down-turned, pointed and beak-like (Fig. 6). The posterior portion of the uncus consists of two heavily setose, globose or slightly flattened lobes (Fig. 6). The male valve is relatively simple and bipartite (tripartite in most *Amastus* and a few *Pseudohemihyalea*), with the apical 1/3 to ¼ divided into costal and saccullar processes (figs. 6-10). The transtilla is low, hump-like and finely scobinate (coarsely spinose or scobinate in most other *Pseudohemihyalea*, long, prong-like and variously scobinate in *Amastus*). Female genitalia are relatively simple across the whole *Pseudohemihylaea-Amastus* group, and no characters were found that distinguish the *ambigua*-group from

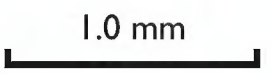



**Figures 6-10. 6**. *P. ambigua*, right lateral view of male genital capsule, aedeagus removed. **7**. *P. syracosia*, lateral view of right valve. **8**. *P. fallaciosa*, lateral view of right valve. **9**. *P. sonorosa*, lateral view of right valve. **10**. *P. potosi*, lateral view of right valve.

other *Pseudohemihyalea*, although the shape of the lamella antevaginalis may prove useful in a more in-depth review of the group. The pine-feeding habits of the larvae (*P. ambigua*) are unique within the genus.

## Key to species of the *Pseudohemihyalea ambigua* species-group

1 Forewing posterior cubital vein and anal vein with separate brown striae; forewing with prominent hook-like mark at distal end of discal cell (fig. 3); male forewing length less than 20 mm, female less than 22 mm; uncus of male with basal lobes flattened and raised dorsally, basally with broad, u-shaped cleft (fig. 13) ..... ***P. fallaciosa***

– Forewing posterior cubital vein and anal vein with confluent, broad brown striae; forewing with hook-like mark at distal end of discal cell small or absent (figs. 1,2,4,5); male and female forewing length variable; uncus of male with basal lobes globose (Figs. 11, 12, 14, 15) ..... **2**

2 Male forewing length greater than 25 mm, female greater than 28 mm; uncus length more than 1.7 mm (Figs. 14, 15); corpus bursae length more than 3 mm and about 3 x diameter of bulla seminalis (fig. 22)..... **3**

– Male forewing length less than 25 mm, female less than 28 mm; uncus length less than 1.7 mm (Figs. 11, 12); corpus bursae length less than 3 mm and about 1-1.5 x diameter of bulla seminalis (Figs. 21, 23) ..... **4**

3 Male valve elongate, approximately 3 x as long as wide (fig. 9); vesica with thin, spine-like cornuti (fig. 20), uncus widest at basal fourth (fig. 15); hindwing with distinct pink flush; northern Sierra Madre Occidental, Mexico .... ***P. sonorosa***

– Male valve broad, approximately 2 x as long as wide (fig. 10); vesica with small, stout cornuti (fig. 19), uncus widest at basal third (Fig. 14); hindwing with faint pink flush; Sierra Madre Oriental, Mexico (females unknown) ..... ***P. potosi***

4 Male uncus long and narrow in dorsal aspect, averaging 2.4 x longer than wide, with basal cleft narrow (fig. 12); saccular process about as long as wide (fig. 7); lateral margins of female lamella antevaginalis parallel or flaring outward towards caudal margin, with caudal concavity broad, *i.e.* more than 2 x width of ductus bursae; southern Mexico to Honduras ..... ***P. syracosia***

– Male uncus broad in dorsal aspect, averaging 1.8-2.0 x longer than wide, with basal cleft broad and relatively shallow, *i.e.* ¼ or less the width of uncus (fig. 11); width of saccular process at base approximately equal to process length (fig. 6); lateral margins of female lamella antevaginalis tapering inwards to caudal margin, with caudal concavity narrower, *i.e.* less than 2 x width of ductus bursae (fig. 21); western USA south through Sierra Madre Occidental, Mexico ..... ***P. ambigua***

***Pseudohemihyalea ambigua* (Strecker), comb. n.**
Figs. 1, 6, 11, 16, 21, 25

*Halisidota ambigua* Strecker, 1878: 274, pl. 9, fig. 7.
*Seirarctia bolteri* H. Edwards, 1885: 121.

**Type material.** *Halisidota ambigua*: Male holotype [FMNH], not examined. Type locality: "Colorado [USA]." The male holotype is a badly damaged specimen with the abdomen, ventral thorax and head missing, although the wings are mostly intact, with the apex of the right forewing missing (J. Rawlins, pers. comm.).

*Seirarctia bolteri*: Holotype [unknown], not examined. Type locality: "Las Vegas, N[ew]. Mex[ico]., 7000 feet [USA]." The sex of the holotype is not indicated in the original description; the type is not among the Edwards type material in the AMNH (B. Vincent, pers. comm.). Given the distinctive original description and absence of species similar to *P. ambigua* in the USA, *bolteri* is retained as a junior synonym of *ambigua*.

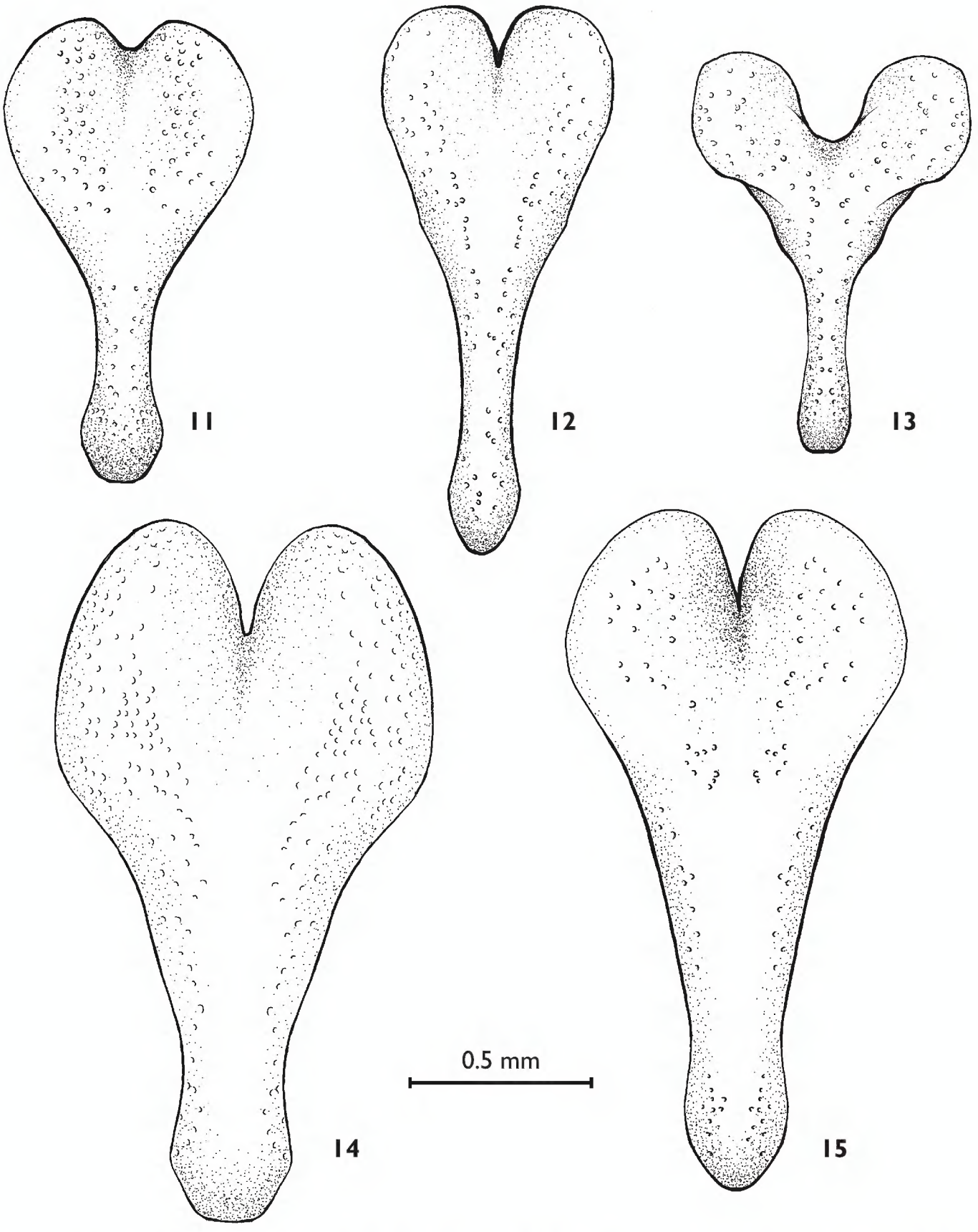
**Diagnosis.** *Pseudohemihyalea ambigua* is very similar to *P. syracosia* externally, but the two can usually be separated without dissection by the slightly larger size, broader forewing striae (Figs. 1 and 2) and more northerly distribution (Fig. 25) of *P. ambigua*. Internally, both the saccular process (cf. Figs. 6 and 7) and uncus (cf. Figs. 11 and 12) are shorter and wider compared to *P. syracosia* (mean length to width ratio of uncus 1.9 in *P. ambigua*, 2.4 in *P. syracosia*). The coecum of the aedeagus is longer and more conical in *P. ambigua* (cf. Figs. 16 and 17). In females, the antevaginal plate is less flared laterally with a shallower distal indentation compared to *P. syracosia* (cf. Figs. 21 and 23).

**Biology and distribution.** Collection dates indicate the peak flight is in July, with extreme dates ranging from mid June to early August, presumably representing a single annual brood. *Pseudohemihyalea ambigua* is the most widespread of the *ambigua*-group, occurring from southern Wyoming (Ferguson et al. 2000) to Durango, Mexico (Fig. 25). Ferguson et al. (2000) show *P. ambigua* as occurring in Tamaulipas, Mexico, but no specimens from Tamaulipas could be located and their record may refer to another species, possibly *P. potosi*.

***Pseudohemihyalea syracosia* (Druce), stat. nov., comb. n.**
Figs. 2, 7, 12, 17, 23, 25

*Halisidota syracosia* Druce, 1889: 87.
*Aemilia ambigua* Toulgoët, 1997 *nec.* Strecker, 1848.

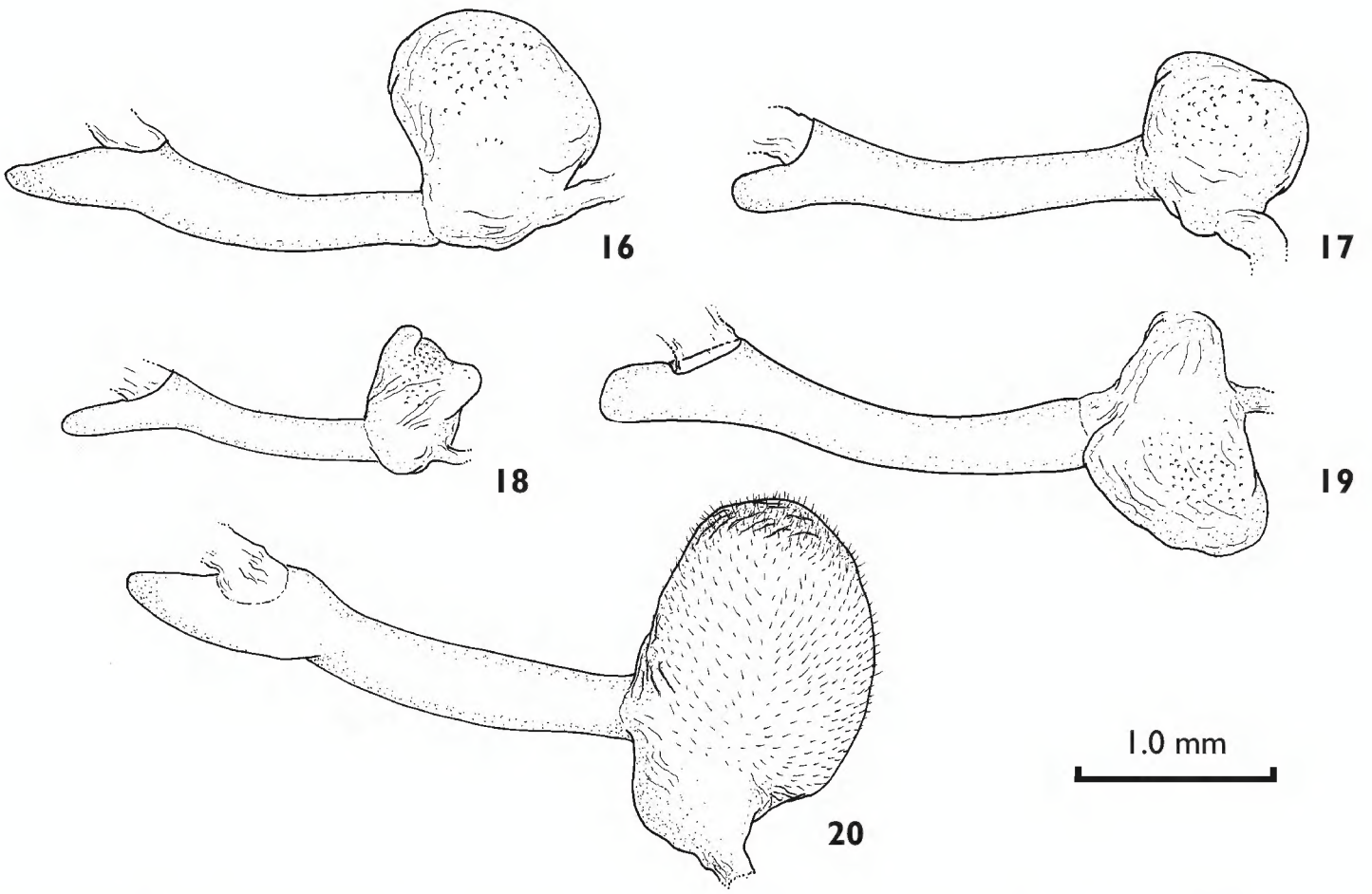
**Type material.** Female holotype [BMNH], photograph examined. Type locality: "Mexico, Omilteme [Omiltemi], Guerrero, 8000 feet." The right antenna and abdomen of the holotype are missing, but the wings are in excellent condition. The abdomen associated with the holotype (in a separate vial) was determined by A. Watson not




**Figures 11-15.** Dorsal view of uncus (setae omitted). **11**. *P. ambigua*. **12**. *P. syracosia*. **13**. *P. fallaciosa*. **14**. *P. potosi*. **15**. *P. sonorosa*.

to belong to the holotype; the holotype abdomen has apparently been lost, since no matching slide exists either (M. Honey, pers. comm.).

**Diagnosis.** *Pseudohemihyalea syracosia* is most similar to and was long confused with *P. ambigua*. They can usually be distinguished without dissection, since *P. syracosia* is slightly smaller and less robust with narrower rust-brown forewing striae on average and less rust brown overall. This species also has a more southern distribution than *P. ambigua*. Sexual size dimorphism is less pronounced in *P. syracosia* than in




**Figures 16-20.** Left lateral view of aedeagus, with fully inflated vesica. **16**. *P. ambigua*. **17**. *P. syracosia*. **18**. *P. fallaciosa*. **19**. *P. potosi*. **20**. *P. sonorosa*.

*P. ambigua*, with female *P. syracosia* averaging very nearly the same size as males (mean forewing length 20 mm), whereas *P. ambigua* females average about 24 mm in forewing length compared to 22 mm in males. Genitalic differences are given under *P. ambigua*.

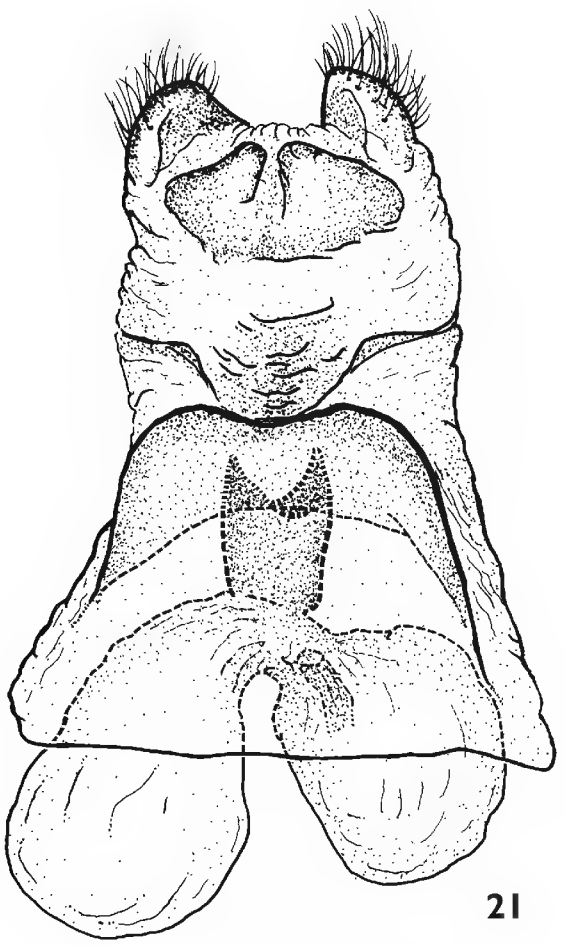
**Biology and distribution.** The immature stages are unknown. Adults have been collected in pine-oak forest, from 1700 m to 2230 m. Collection dates range from mid-May to early September. *Pseudohemihyalea syraciosa* occurs from Michoacan, Mexico to Honduras (Fig. 25), flying in strict sympatry with *P. fallaciosa* at some sites.

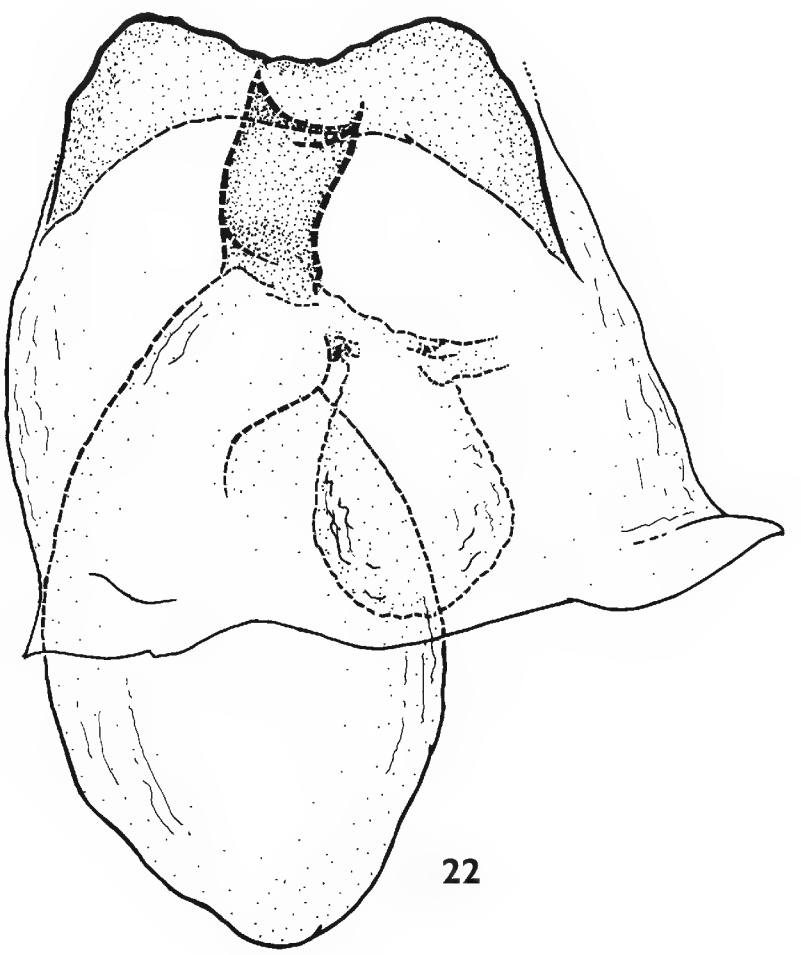
**Remarks.** *Pseudohemihyalea syracosia* has long been treated as a subjective synonym of *P. ambigua*, but the characters given above in the diagnosis and species key show it is distinct from *P. ambigua*, with a more southerly and apparently allopatric distribution. The diagnosis and illustrations of *"P. ambigua"* given by Toulgoët (1997) apply to *P. syraciosa*.

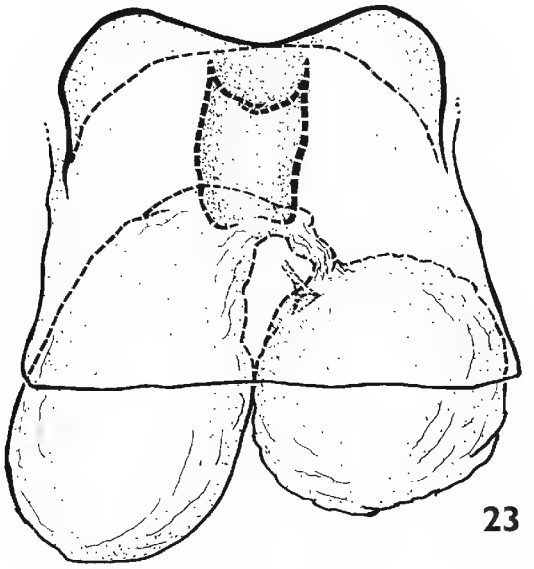
***Pseudohemihyalea fallaciosa* (Toulgoët), comb. n.**
Figs. 3, 8, 13, 18, 24, 25

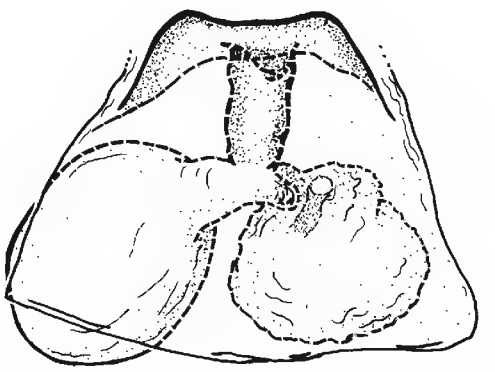
*Aemilia fallaciosa* Toulgoët, 1997, 81, figs. 3, 4, 7, 10.

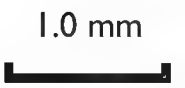
**Type material.** Male holotype, female allotype [MNHN] and 39 paratypes [MNHN, BMNH]. Type locality: "Honduras, P. Morazan, 24 km N.E. de Tegucicalpa [Tegucigalpa], La Tigra, 1900 m."




**Figures 21-24.** Ventral view of female 8th sternite and bursa copulatrix (corpus bursae on left, bulla seminalis on right). **21**. *P. ambigua*. **22**. *P. sonorosa*. **23**. *P. syracosia*. **24**. *P. fallaciosa*.

**Diagnosis.** This is the most easily recognized member of the *ambigua*-group. The tooth-like mark at the distal end of the forewing cell and the presence of a lined posterior cubital vein are diagnostic. Other diagnostic characters are the small size (mean male forewing length 18.4 mm), and thin forewing vein lines. Internally, the basal lobes of the uncus are slightly flattened (globose in other species) and divided by a broad, u-shaped cleft, compared to the narrow, v-shaped cleft in other species.

**Biology and distribution.** Collection dates for *P. fallaciosa* are late May to late July and early September. It has been collected at elevations of 1400 m to 1900 m, from Chiapas, Mexico south to Guatemala and Honduras.

***Pseudohemihyalea sonorosa* Schmidt, sp. n.**
urn:lsid:zoobank.org:act:E93D6C4F-07C4-42AF-97EE-2C283679E945
Figs. 4, 9, 15, 20, 22, 25

**Type material. Holotype –** ♂, Mexico, Sonora, Mesa Compañera, 12 mi. w. Yecora, 2600 m, 10-14 Sep 2004, P.A. Opler [CNC]. Paratypes. 2 ♀♀, same data as holotype [CSU]; 1♂, 4♀♀, Same locality as holotype, 10 sep 2004, leg. Bowman and Opler [DEB].

**Diagnosis.** This species is superficially most similar to *P. ambigua* and *P. potosi* **sp. n.**, but *P. sonorosa* can be separated from both by its significantly larger size, distinct pink hindwing cast, and late flight period (September vs. June-July). Internally, the uncus is 1.4 x longer than that of *P. ambigua*, averaging 1.8 mm compared to 1.3 mm in *P. ambigua*; the uncus has a deeper, narrower basal cleft than *P. ambigua* (cf. Figs. 15 and 11); compared to *P. potosi* **sp. n.**, *P. sonorosa* has an elongate, not triangular saccular process, and a much longer and narrower valve overall (cf. Figs. 9 and 10). The male vesica is covered in hair-like spines, unlike the small thorn-like cornuti of all other *ambigua*-group species. In females, the corpus bursae is nearly 3 x as large as the bulla seminalis (fig. 22), compared to about 1.5 x in other members of the *ambigua*-group.

**Description. Head –** male antenna strongly bipectinate, longest rami about 6.0 x longer than segment length; dorsal antennal scales pale rusty brown; vestiture of palps mostly pink with a few rust scales, frons and vertex rust, pinkish red bordering patagia. **Thorax –** vertex of thorax, patagia and tegulae rusty tan, tegulae slightly paler mesially; ventrally, thorax rusty tan tinged with pink; legs rusty tan, pink dorso-medially. **Forewing –** length (♂) 26.1 mm ($n$ = 2), (♀) 31.2 mm ($n$ = 2); intervenal areas ivory white, sparsely scaled, semi-translucent; veins broadly lined with rusty tan; fringe and costal margin tan-lined, anal margin with narrow white border; pattern similar ventrally but colours appearing washed-out. **Hindwing –** sparsely scaled, semi-translucent, pale pink; anal margin more densely scaled with pink scales. **Abdomen –** pink dorsally, pale tan ventrally; coremata absent. **Male genitalia –** uncus shaped like a bicycle saddle, i.e., with broad, bilobed base and tapering, finger-like apex; basal lobes heavily setose dorsally, apical portion slightly wider than median, with a spade-shaped dorsal profile; apex bluntly pointed, slightly down curved; division between costal and saccular processes extending slightly less than one-third of total valve length; apex of costal process bluntly rounded, tapering more gradually dorsally than ventrally; saccular process rounded-triangular, tapering to rounded apex; vinculum a short, broad scobinate conical projection; juxta urn-shaped in outline, with medial keel along dorso-ventral axis; saccus short, extending slightly cephalad beyond tegumen; aedeagus without spines; vesica simple, globose, lacking spines but with very fine indistinct cornuti. **Female genitalia –** lamella antevaginalis broad, flangelike, caudal margin concave; ductus bursae sclerotized, 2 x longer than wide and strongly flattened dorso-ventrally; corpus bursae simple, globose-ellipsoidal, signa lacking; ductus seminalis arising dorsally from caudal part of bursa near junction with ductus; bulla seminalis globose, approximately 1/3 diameter of corpus bursae when inflated.

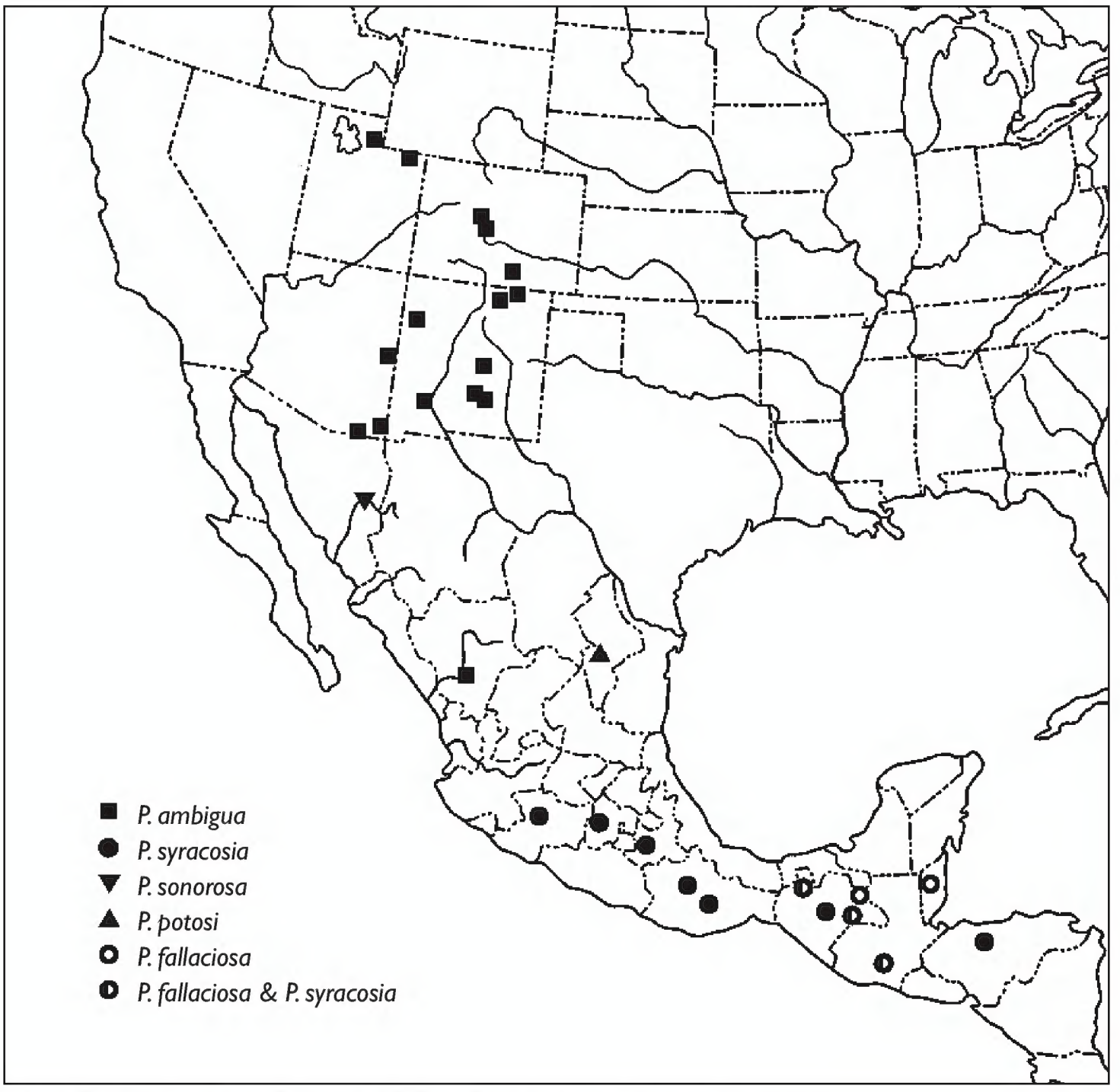



**Figure 25.** Distribution of examined specimens of *Pseudohemihyalea*.

**Biology and distribution.** The immature stages are unknown. *Pseudohemihyalea sonorosa* flies in upper elevation pine-oak forests of the Sierra Madre Occidental, Mexico during September. It is known only from the type locality, in the state of Sonora.

**Remarks.** The name *sonorosa* is derived from both its occurrence in the state of Sonora and its pronounced rose-coloured hindwings.

***Pseudohemihyalea potosi* Schmidt, sp. n.**
urn:lsid:zoobank.org:act:74CFED3B-3341-47E4-8035-2C6BA4D5B4C5
Figs. 5, 10, 14, 19, 25

**Type material. Holotype –** ♂, Mexico, N[uveo] L[eón], Cerro Potosí, 10,300', 15-16 Jul 1963, H. and A. Howden [CNC]. **Paratypes –** 2 ♂♂, same data as holotype [CNC].

**Diagnosis.** *Pseudohemihyalea potosi* is most similar to *P. ambigua*, but can be distinguished by its larger size (forewing length 25 mm or more, vs. 24 mm or less in *P. ambigua*). Internally, the saccular process is long and rounded in *P. potosi*, short and triangular in *P. ambigua*, and the uncus is half again as large with a deeper basal cleft and more elongate basal lobes.

**Description. Head** – male antennae strongly bipectinate, longest rami about 5.7 x longer than segment length; dorsal antennal scales pale rusty brown; vestiture of palpi mostly pink with a few rust scales, frons and vertex rust, pinkish red bordering patagia. **Thorax** – vertex of thorax, patagia and tegulae rusty tan, tegulae tinged with pink laterally; ventrally, thorax rusty tan tinged with pink; legs rusty tan, pink dorso-medially. **Forewing** – length 25.7 mm ($n$ = 3); intervenal areas ivory white, sparsely scaled, semi-translucent; veins broadly lined with rusty tan; fringe and costal margin tan-lined, anal margin with narrow white border; pattern similar ventrally but colours appearing washed-out. **Hindwing** – sparsely scaled, semi-translucent, pale tan white overall; anal margin more densely scaled with faintly pinkish scales, although colours may be somewhat faded due to age of the specimens at hand. **Abdomen** – pink tan dorsally, pale tan ventrally; coremata absent. **Male genitalia** – uncus shaped like a bicycle saddle, basal lobes heavily setose dorsally; apical portion slender, finger-like, slightly wider than median portion, with a spade-shaped dorsal profile; apex bluntly pointed , slightly down curved; division between costal and saccular processes extending over slightly more than one-third of total valve length; apex of both processes bluntly rounded; vinculum consisting of a short, broad, scobinate conical projection; juxta urn-shaped in outline, with medial keel along dorso-ventral axis; saccus short, extending slightly cephalad beyond tegumen; vesica relatively small, simple, globose, without spines but with very fine indistinct cornuti. **Female genitalia** – unknown.

**Biology and distribution.** *Pseduohemihyalea potosi* is currently known only from Cerro Potosí, the highest peak in the Sierra Madre Oriental in the state of Nuevo Leon, Mexico. This area is known for its high plant diversity and endemicity.

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## References

Druce H (1889) Description of new species of Lepidoptera from Central America. Annals and Magazine of Natural History (6) 4: 77-94.

Dyar HG (1914) Notes on *Hemihyalea* and some species of *Amastus*. Insecutor Inscitiae Menstruus 2: 146-151.

Edwards H (1885) Apparently new species of N. American Heterocera. Papilio 4: 121-122.

Hampson G (1901) Catalogue of the Arctiadae (Arctianae) and Agaristidae in the collection of the British Museum (Natural History) In: Catalogue of the Lepidoptera Phalaenae in the collection of the British Museum (Natural History). London. Vol. 3, 12 + 609 pp., plates 36-54.

Ferguson DC, Opler PA, Smith MJ (2000) Moths of Western North America. 3. Distribution of Arctiidae of Western North America. Part 1. Text, maps, and references. C.P. Gillette Arthropod Biodiversity Museum, Ft. Collins, CO. 171 pp.

Franclemont JG (1983) Arctiidae. In: Hodges RW (Ed) Checklist of the Lepidoptera of North America north of Mexico. E.W. Classey Ltd. and the Wedge Entomological Research Foundation, London, 284 pp.

Lafontaine JD (2004) Noctuoidea: Noctuidae (part), Noctuinae (part - Agrotini). In: Hodges RW (Ed) The Moths of North America, fascicle 27.1. Wedge Entomological Research Foundation, Washington, D.C., 385 pp.

Lafontaine JD, Fibiger M (2006) Revised higher phylogeny of the Noctuoidea (Lepidoptera). Canadian Entomologist 138: 610-635.

McFarland N (1975) Larval foodplant records for 106 species of North American moths. Journal of the Lepidopterists' Society 29: 112-125.

Rego-Barros AR, do (1956) Contribução ao estudio da familia Arctiidae. Boletim do Museu Nacional Rio de Janeiro (Nova Serie) (Zool.) 134: 1-65.

Strecker H (1878) Descriptions of some species and varieties of North American Heteroceres, mostly new. Proceedings of the Davenport Academy of Sciences 2: 270-275.

Toulgoët H, de ([1988] 1987) Note pour servir a la revision du genre *Amastus* Walker 1855 avec examen critique du genre *Hemihyalea* Hamspon 1901 (24e note) (Lepidoptera Arctiidae). Nouvelle Revue d'Entomologie (N.S.) 4:363-368.

Toulgoët H, de ([1992] 1991) Reclassification d'arctiides neotropicales actuellement rangées dans les genres *Hemihyalea* Hampson 1901 et *Amastus* Walker 1855 (Lepidoptera, Arctiidae) (39 eme note). Nouvelle Revue d'Entomologie 8: 259-265.

Toulgoët H, de (1994) Révision du genre *Pseudohemihyalea* Rego Barros, 1956 (olim *Hemihyalea* Hampson, 1901) et description de deux espèces nouvelles (46e note) (Lepidoptera, Arctiidae, Arctiinae). Revue Francaise d'Entomologie (Nouvelle Serie) 16: 121-135.

Toulgoët H, de (1996) Contribution à la connaissance du genre *Pseudohemihyalea* Rego Barros avec description de deux taxons nouveaux d'Amérique centrale (Lepidoptères Arctiidae, Arctiinae) (49e note). Nouvelle Revue d'Entomologie (N.S.) 13: 179-184.

Toulgoët H, de (1997) Description d'une nouvelle arctiide d'Amerique Central (Lépidoptères Arctiidae, Arctiinae). (52e note). Lambillionea 97: 45-48.

Toulgoët H, de (2001) Description de nouvelles arctiides Neotropicales (Lepidoptera Arctiidae Arctiinae) (69eme note). Lambillionea 101: 399-402.

Watson A (1971) An illustrated catalogue of the Neotropic Arctiinae types in the United States National Museum (Lepidoptera: Arctiidae). Part 1. Smithsonian Contributions to Zoology 50: 1-361.

Watson A, Goodger DT (1986) Catalogue of the Neotropical tiger moths. Occasional Papers on Systematic Entomology: 1-71.

Weller S, DaCosta M, Simmons R, Dittmar K, Whiting M (2008) Evolution and Taxonomic Confusion in Arctiidae. In: Conner, W (Ed) Tiger Moths and Woolly Bears: Behavior, Ecology, and Evolution of the Arctiidae. Oxford University Press, Oxford, 11-30.